



Concussions in the National Hockey League

NHL General Managers' Meeting
March 2011



Why Concussions Have Been In the Spotlight in 2010-11?

1. NHL - new Rule 48
2. Players out long term

Marc Savard, David Perron, Andy McDonald, Matthew Lombardi, Raitis Ivanans , Jeff Halpern, Derek Boogaard, Kyle Cumiskey, Tom Poti, Jim Slater, Sidney Crosby
3. Recently released studies of junior teams
 - i) Paul Echlin (London, Ont.) followed two junior teams (average age of 18) in 2009-10 season. 69% of hits causing a concussion were to the head, and 80% of hits that caused concussions were intentional.
 - ii) University of Alberta Assistant Professor Martin Mrazik followed two Edmonton minor hockey associations (age 12-13) in 2009-10. 10% of players suffered concussions.
4. NFL – rule change, media coverage, dementia
5. Mayo Clinic conference on concussions in youth hockey (Fall 2010)
6. Boston Sport Legacy Institute CTE (Fleming, Probert, NFL)
7. Legislation regarding youth concussions introduced in most states.
National concussion legislation.



NHL: March 2010 – March 2011

1. March 2010 – Adoption of Rule 48
2. Concussion Evaluation and Management Protocol – Revisions
3. Continued Education/Training
 - NHL BOG, GMs, Team Athletic Trainers, Doctors
4. Shoulder Pads – Increased Padding (September 2010)
5. Concussion Education Video – ThinkFirst
6. Seamless Glass Injury Analysis

Concussion Evaluation and Management Protocol



Step 1: Neuropsychological baseline testing:

- Neuropsychological testing examines neurocognitive functioning.....
- Learning, Memory, Information Processing Speed, Problem Solving Skills, Cognitive Flexibility.
- Emphasis on functional rather than structural assessment.

Concussion Evaluation and Management Protocol



– Step 2:

- If visible signs of concussion are observed by the Club, or symptoms of concussion are reported by the player:
 - Player shall be removed from playing environment (not discretionary) to be evaluated for concussion
 - A team physician shall conduct evaluation in a quiet place
 - NHL SCAT2 (trial tool)
 - Players who have these signs or symptoms shall not be returned to play until they have been examined by a team physician, and cleared to return to play

Concussion Evaluation and Management Protocol



Concussion Signs (Observable)

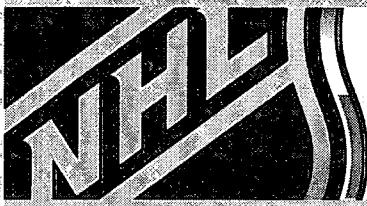
- Any loss of consciousness;
- Difficulty getting to feet following a hit;
- Motor incoordination/balance problems (stumbles, “rubber legs”, trips/falls, slow/labored skating);
- Blank or vacant look ;
- Disorientation (e.g unsure of where he is on the ice or location of bench);
- Clutching of head after a hit;
- Visible facial injury in combination with any of the above.

Concussion Evaluation and Management Protocol



Concussion Symptoms (Player reported)

- Headache;
- Dizziness;
- Balance or coordination difficulties;
- Nausea;
- Amnesia for the circumstances surrounding the injury (i.e., retrograde/anterograde amnesia);
- Cognitive slowness;
- Light/sound sensitivity;
- Disorientation;
- Visual disturbance;
- Tinnitus.



NHL Modified SCAT 2

- Orientation
- Symptom Questionnaire
- Motor Coordination
- Cognitive Assessment (Verbal Learning/Concentration)
- Delayed Recall
- Physical Exercise

Concussion Evaluation and Management Protocol



Step 3:

- If a concussion is not diagnosed, can return to play.
- If a concussion is diagnosed, in most instances do not return to play.
 - Although uncommon, it may be appropriate for the Team Physician to clear the player to return to play in the same game if the player has rapid and complete recover of symptoms at rest and upon exertion, and has returned to neurocognitive baseline as determined by a formal acute evaluation tool such as the NHL SCAT2.
 - If diagnosed with a concussion, refer for neuropsychological testing once symptom free at rest and upon exertion.

Concussion Evaluation and Management Protocol



Step 4: At minimum, a player must be symptom free at rest and upon exertion and cognitively at baseline before returning to play.

Concussion Evaluation and Management Protocol



- Emphasis on the importance of accurate, immediate symptom reporting.
- Emphasis on prompt and thorough evaluation of any player evidencing visible signs of concussion, or reporting symptoms of concussion.
- Emphasis on evolving and dynamic nature of concussion symptoms.
- Each concussion is managed individually.
- No mandatory period player shall be withheld from play following a concussion.

Concussion Evaluation and Management Protocol



- Protocol issued by NHL Concussion Working Group – NHL and NHLPA neuropsychologists, NHL team physicians, NHL team athletic trainers
- First major professional sports league to issue such a comprehensive protocol
- Adapt/revise protocol as the science evolves and based on our experience



Compliance with the Protocol?

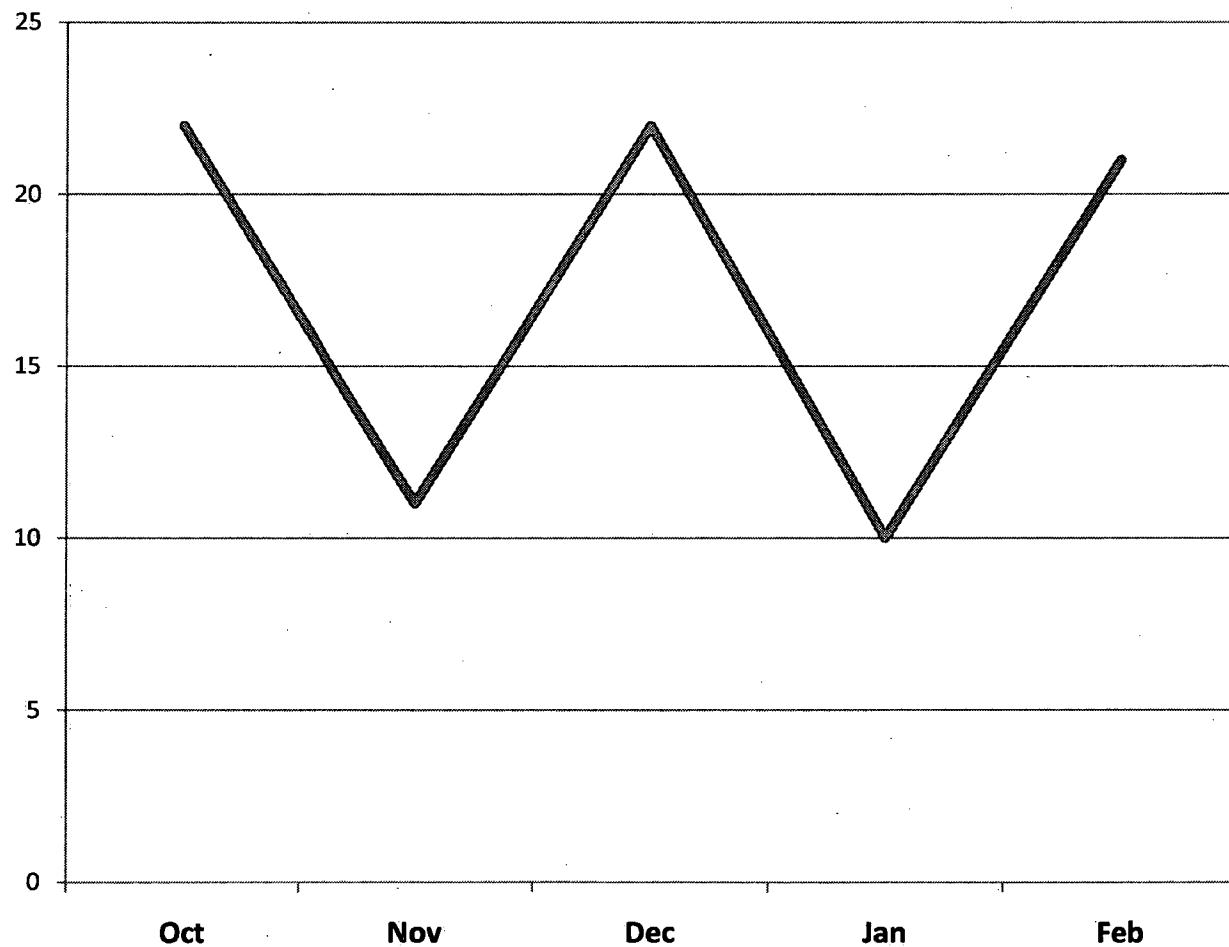
- Some players suspected of having a concussion are not evaluated away from the ice surface.
 - Revisions to the protocol address this.
- Some players are returned to play without post-injury neuropsychological testing.
- Some players are returned to play even though they are not cognitively normal as per the neuropsychological testing.



Frequency of Concussions in the NHL



Monthly Concussions 2010-2011



15

NHL0023055



Concussion Count

(up to Mar 1st of each year)

CONCUSSIONS	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Regular Season Game Concussions	55	58	53	61	86
% of all Regular Season Game Injuries	2%	2%	3%	3%	4%
Man Games Lost - Concussions	357	382	296	272	753
% of all Regular Season MGL	9%	8%	8%	7%	17%

- Significant increase in regular season game concussions and MGL
- 26 new concussions in 270 games since January 15
- 10 players account for 391 MGL in 2010/11
 - 5 accidental; 2 legal hits to the body; 2 fighting; 1 illegal hit to head
- 10 players account for 172 MGL in 2009/10
 - 1 accidental; 5 legal hits to the body; 3 illegal hits to the head; 1 illegal hit to the body



Concussions

How are They Happening?

Incidents Not Involving Opponents + Inadvertent Collisions with Opponents

- Collisions with teammates
- Trips and falls not involving an opponent
- Hit by puck
- Inadvertent collisions with opponents

Fighting

Legal Hits

- Hits to the body
- Hits to the head

Illegal Hits

- Blindside hits to head
- Other hits to the head
- Hits to the Body

Concussions

How are They Happening?



Video of All Concussions

2010/2011

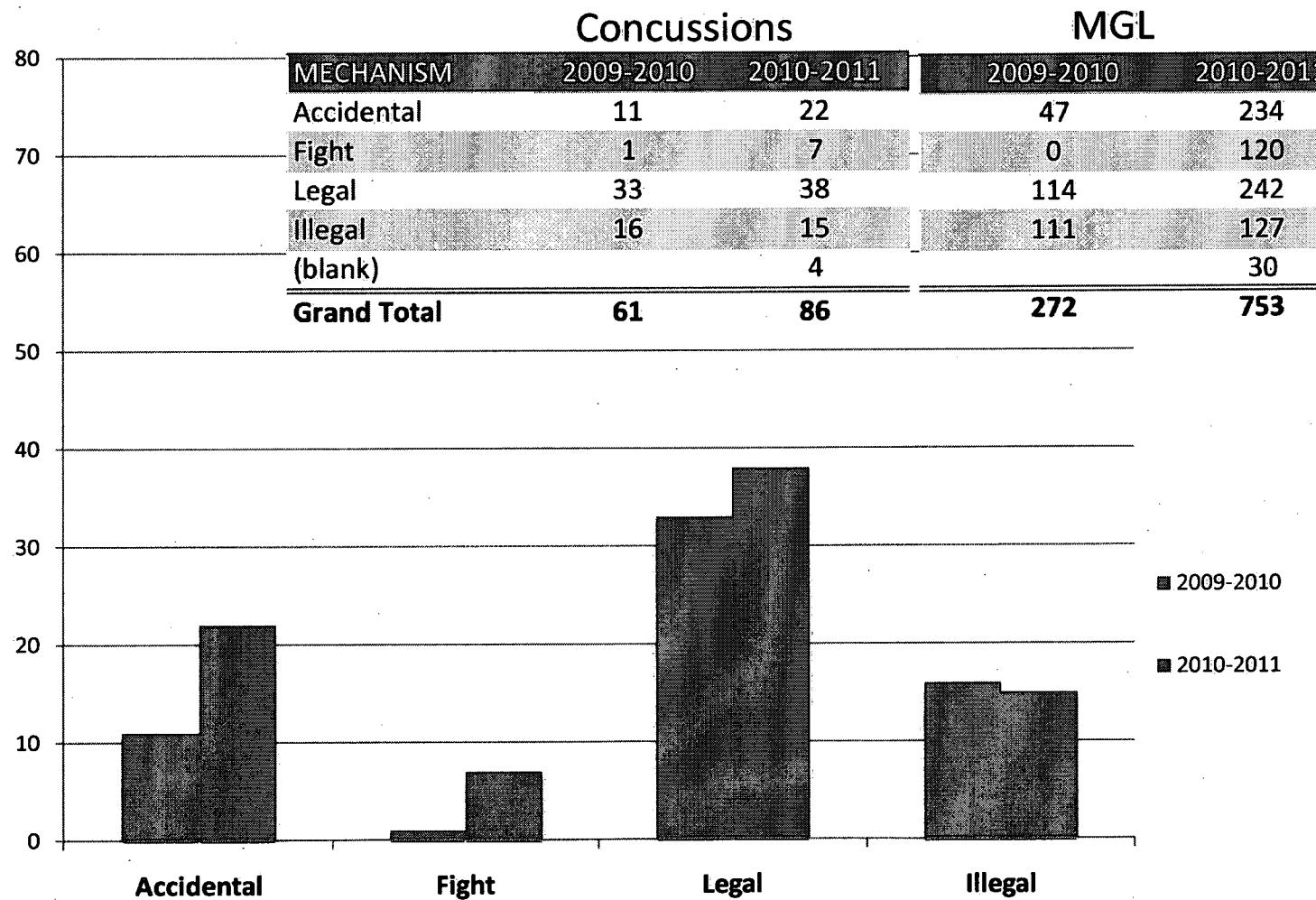
(through March 1)

Concussions (thru March 1)

How are They Happening?



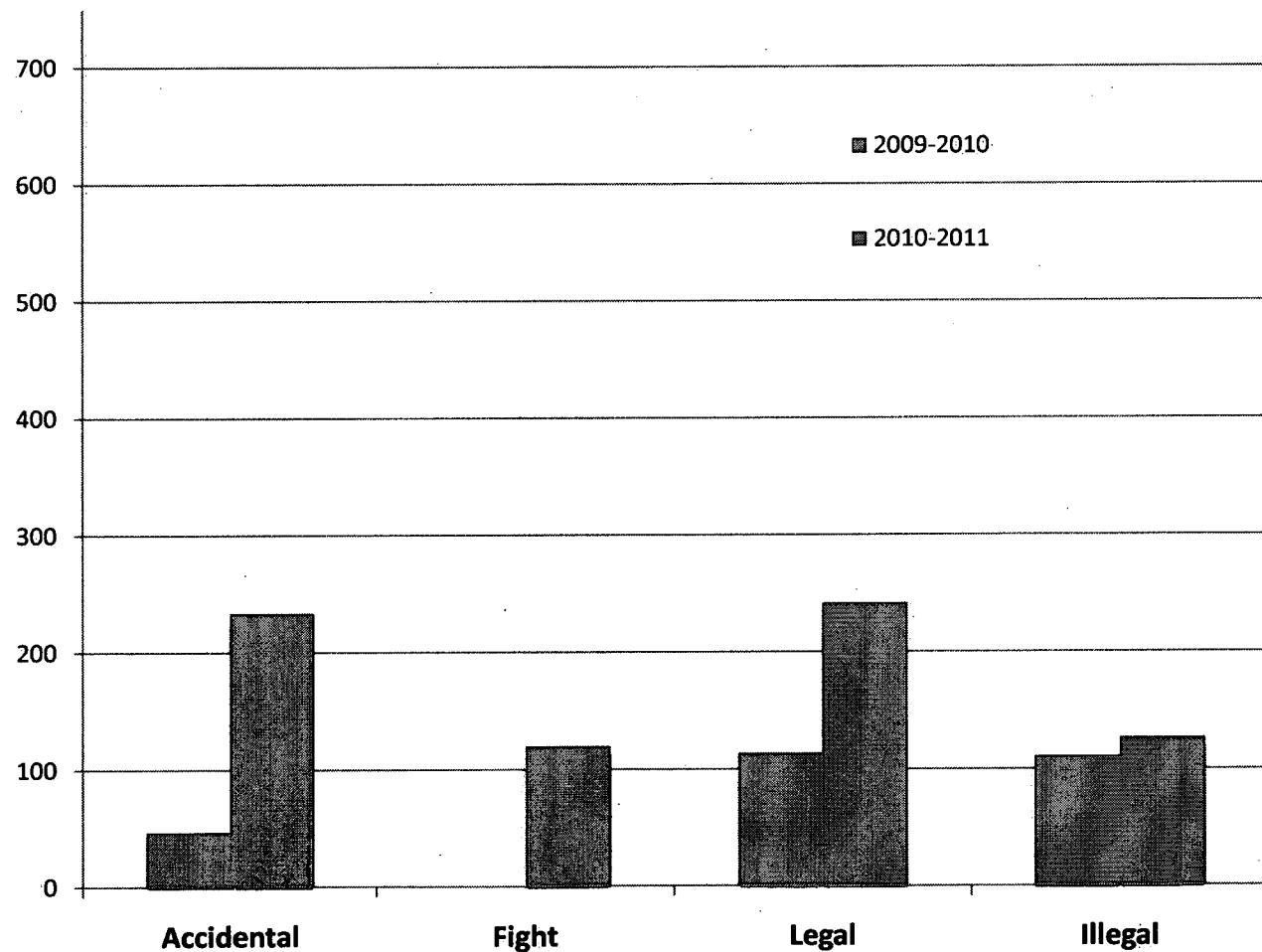
Number of Concussions





How are Man Games Lost?

Man Games Lost





Players Currently Out With A Concussion

(as of March 1)

INADVERTENT/ACCIDENTAL

Player 1 - inadvertent collision – 62 games
Player 2 - hit by teammate – 27 games
Player 3 - hit by teammate – 23 games
Player 4 - inadvertent collision – 21 games
Player 5 - hit by puck – 10 games

LEGAL HIT

Player 10 - hit to body – 46 games
Player 11 - hit to body – 15 games
Player 12 - hit to body – 13 games
Player 13 - hit to body - 9 games
Player 14 - hit to body – 7 games
Player 15 - hit to head – 5 games
Player 16 - hit to head – 5 games
Player 17 - hit to head – 0 games

FIGHT

Player 6 – 65 games
Player 7 – 35 games
Player 8 – 5 games
Player 9 – 1 game

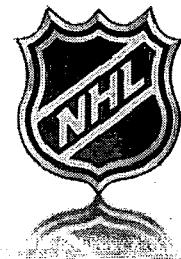
ILLEGAL HIT

Player 18 - blindside hit – 53 games
Player 19 - hit to body – 19 games
Player 20 - hit to head – 7 games
Player 21 - hit to head – 6 games
Player 22 - hit to head – 0 games



Accidental Play and Inadvertent Collisions

Video



Accidental Play and Inadvertent Collisions

MECHANISM	Concussions		MGL	
	2009-2010	2010-2011	2009-2010	2010-2011
Hit by teammate	3	6	6	59
Fall	4	4	7	39
Hit by puck	2	5	4	38
Collision with Opponent	2	7	30	98
Grand Total	11	22	47	234
All Concussions	61	86	272	753
Percent of all concussions	18%	26%	17%	31%

- 26% of concussions are from accidental play/inadvertent collisions
- Significant increase in concussions caused by accidental play and inadvertent collisions from 2009/10 to 2010/11 – from 11 to 22
- MGL increase year to year from 47 to 234 (5-fold increase)

Accidental Play and Inadvertent Collisions



MECHANISM	Concussions		MGL	
	2009-2010	2010-2011	2009-2010	2010-2011
Hit by teammate	3	6	6	59
Fall	4	4	7	39
Hit by puck	2	5	4	38
Collision with Opponent	2	7	30	98
Grand Total	11	22	47	234
All Concussions	61	86	272	753
Percent of all concussions	18%	26%	17%	31%

- MGL associated with “accidental” conduct (hit by teammate, fall, hit by puck) increased 8-fold (from 17 to 136)
- MGL associated with “inadvertent collisions with an opponent” increased 3-fold (from 30 to 98)



Fighting

Concussions

MECHANISM	2009/2010	2010/2011
Fighting	1	7

MGL

	2009/2010	2010/2011
	0	120

All Concussions	61	86	272	753
Fighting Percentage	2%	8%	0%	16%

- Concussions reported from fighting are likely understated.
- Increase in number of fights and MGL caused by concussions, from year to year.
- Fighting accounts for 8% of the concussions and 16% of the MGL this year
- Ivanans has been out since the first game of the year (65 MGL), Boogaard has 35 MGL



Legal Hits

Video



Legal Hits

Concussions

MECHANISM	2009-2010	2010-2011
Hit to body	21	26
Hit to head	12	12
Grand Total	33	38
All Concussions	61	86
Percent of all concussions	54%	44%

MGL

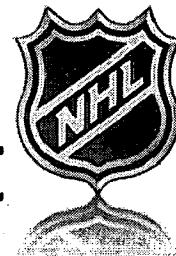
	2009-2010	2010-2011
	89	196
	25	46
114	242	
All Concussions	272	753
Percent of all concussions	42%	32%

- Legal hits account for 44% of concussions this year.
- Hits to the body increased slightly year to year with a significant increase in MGL from 89 to 196.



Legal “Hits to the Head”

MECHANISM	2009-2010	2010-2011
Shoulder to Head	9	5
Arm to Head	1	4
Glove to Head	2	1
Helmet to Helmet		2
TOTAL	12	12



Legal Hits –Secondary Contact

Concussions

CONTACT WITH	2009-2010	2010-2011
Glass	13	15
Boards	4	5
Ice	3	2
TOTAL	20	22

MGL

	2009-2010	2010-2011
	52	148
	4	21
	8	2
	64	171

Total Legal hits 33 38
Percent with Secondary Contact 61% 58%



Environment

Concussions

Glass Type	end glass	side glass
Acrylic	11	12
Seamless (blank)	12	5
Grand Total	23	17

MGL

	end glass	side glass
	62	43
	125	41
Grand Total	187	84

RELATIVE RISK

4.4 0.7

8.1 1.7

- Although there are only 6 venues entirely fitted with seamless glass, and 5 with seamless sides, there are almost as many concussions against seamless glass (17) as there are against acrylic (23)
- There are more MGL against seamless (166) than acrylic (105)
- The risk of concussion is 4.4 times higher against seamless glass in the ends and the risk of time loss is 8 times higher
- The risk of concussion against seamless sides is about the same (but risk of time loss is almost 1.7 times higher).



Illegal Hits

Video



Illegal Hits

Concussions

MGL

MECHANISM	2009-2010	2010-2011
Blindside hit to the head	4	1
Hit to head	6	7
Hit to body	6	7
Grand Total	16	15

	2009-2010	2010-2011
Blindside hit to the head	58	53
Hit to head	27	31
Hit to body	26	43
Grand Total	111	127

All Concussions	61	86	272	753
Percent of all concussions	26%	17%	41%	17%

- There has been little change in the number of illegal acts causing concussions.
- There has been a decrease in the blindside hits to the head following the introduction of rule 48.
- **Illegal hits are not the cause of the increase we are seeing.**



Illegal Actions Causing Concussions

2010-11 (through Mar 1)

Date	Aggressor	Victim	Penalty Type	Supplemental Discipline	Games Lost to Injury
2/25/2011	Derek Stepan	Mike Green	None	\$2,500	2
2/11/2011	Mark Fistic	Fernando Pisani	Interference	No	8+
2/11/2011	Trevor Gillies	Eric Tangradi	Elbow Major	9 games	7+
1/17/2011	Scott Nichol	David Schlemko	None	4 games	13
1/16/2011	Troy Brouwer	Francis Bouillon	Boarding	No	19
12/26/2010	Dustin Byfuglien	Randy Jones	Boarding	\$2,500	1
12/15/2010	Ryan O'Byrne	Viktor Stalberg	Boarding	No	3
12/15/2010	Jamie Langenbrunner	Ilya Bryzgalov	Goalie Interference	No	5
12/3/2010	Jared Boll	Shaone Morrisonn	Illegal Hit to the Head	\$2,500	0 (8)
11/19/2010	Andrew Cogliano	Kyle Turris	Boarding Major	No	3
11/4/2010	Joe Thornton	David Perron	Rule 48	2 games	53
10/30/2010	Trent Hunter	Andrej Meszaros	Boarding Major	No	1
10/26/2010	Stephane Robidas	Matt Belesky	Boarding	Auto. 1 game	7
10/23/2010	Alex Ovechkin	Chris Mason	Goalie Interference	No	0
10/11/2010	Niklas Hjalmarsson	Jason Pominville	Boarding Major	2 games	9



Rule 48

Rule 48 – “Illegal Check to the Head” (adopted March 2010, modified June 2010)

- A major penalty and a game misconduct shall be assessed for a ‘lateral or blind side hit to an opponent where the head is targeted and/or the principle point of contact’
- If deemed appropriate, a referee can assess a match penalty
- Two game misconducts results in an automatic suspension
- Can be reviewed for supplemental discipline



Rule 48 Incidents

(March 2010 – March 1, 2011)

Date	Aggressor	Victim	Penalty Assessed	Games Suspended	Fine	Games Lost to Injury
14-Oct-10	Nick Foligno	Patrick Dwyer	No on-ice penalty	None	\$2,500	N/A
16-Oct-10	Tom Gilbert	Matt Stajan	Interference Minor	None	\$2,500	N/A
17-Oct-10	Shane Doan	Dan Sexton	No on-ice penalty	3	No	N/A
04-Nov-10	Joe Thornton	David Perron	Rule 48 - major and game misc.	2	No	53
18-Dec-10	Matt Martin	Vernon Fiddler	Rule 48 - major and game misc.	2	No	N/A
03-Feb-11	Daniel Paille	Raymond Sawada	Rule 48 - major and game misc.	4	No	N/A (minors)

- 4 of the 6 Rule 48 incidents occurred in the first month of this season, as players were adjusting to the new rule
- 1 of the 6 Rule 48 incidents resulted in a concussion and games missed (Perron - 53 games)
- 5 of the 6 Rule 48 incidents did not result in a concussion



Supplemental Discipline Imposed for Hits to the Head

2009-10 (through Mar 1)

Date	Aggressor	Victim	Infraction	Games Suspended	Suspension \$	Games Lost to Injury
2/13/2010	Cam Janssen	Matt Bradley	Shoulder	5	\$14,248.70	No *
1/29/2010	Mike Green	Michael Frolik	Shoulder	3	\$81,606.21	No
1/9/2010	Ed Jovanovski	John Tavares	Elbow	2	\$158,536.59	No
12/7/2009	Ed Jovanovski	Andrew Ebbett	Elbow	2	\$67,357.52	5
11/28/2009	Matt Cooke	Artem Anisimov	Elbow	2	\$29,268.30	No
11/7/2009	Curtis Glencross	Chris Drury	Shoulder	3	\$18,652.86	5
10/31/2009	James Wisniewski	Shane Doan	Shoulder	2	\$28,497.40	No

- In 2009/2010 (through Mar 1), pursuant to Supplemental Discipline, 7 players were suspended for hits to the head.

Supplemental Discipline Imposed for Hits to the Head

2010-11 (through Mar 1)



Date	Aggressor	Victim	Infraction	Games Suspended	Suspension \$	Games Lost to Injury
2/11/2011	Trevor Gillies	Eric Tangradi	Elbow	9	\$24,193.53	7+
2/8/2011	Anton Volchenkov	Zach Boychuk	Elbow	3	\$68,548.38	No
2/3/2011	Daniel Paille	Raymond Sawada	Rule 48 (Shoulder)	4	\$23,118.28	9
1/17/2011	Scott Nichol	David Schlemko	Elbow	4	\$16,344.08	13
1/13/2011	Mike Brown	Ed Jovanovski	Shoulder/Elbow	3	\$8,669.34	5
1/7/2011	Ben Eager	Colby Armstrong	Sucker Punch	4	\$20,752.68	No
1/7/2011	Tom Kostopoulos	Brad Stuart	Shoulder	6	\$29,569.92	15
12/28/2010	Jody Shelley	Andrew Alberts	Sucker Punch	2	\$26,829.27	No
12/18/2010	Matt Martin	Vernon Fiddler	Rule 48 (Elbow)	2	\$6,792.12	No
11/17/2010	Olli Jokinen	Wojtek Wolski	Crosscheck	3	\$48,387.09	No
11/4/2010	Joe Thornton	David Perron	Rule 48 (Shoulder)	2	\$77,419.36	53+
10/30/2010	Danny Briere	Frans Nielsen	Stick	3	\$237,804.87	No
10/17/2010	Shane Doan	Dan Sexton	Rule 48 (Shoulder)	3	\$73,387.11	No

- There has been an increase in the number of suspensions (13 in 2010/11 vs. 7 in 2009/10)
- In 2010/2011 (through Mar 1), in 13 suspensions, 6 players have missed games due to injury.



DISCUSSION POINTS



Discussion Points

- *Do we have a problem with concussions in our league, and with head hits specifically?*
- *If so, how should we address it?*
- *The challenge: How to maintain the physicality in the game while reducing the incidence of concussions?*



Discussion Points

Accidental and Inadvertent Collisions

- 26% of concussions this year are from accidental play/inadvertent collisions
- Accidental play/inadvertent collisions have doubled year to year, and resulted in a five-fold increase in man games lost
- 8% of concussions this season (7 of 86) have involved an “inadvertent collision” where the player is totally unaware (no penalty) – four of these incidents have involved a shoulder hit to the head
- Last season there were only 2 inadvertent collisions
 - *Are these “inadvertent”?*
 - *Should we consider penalizing inadvertent collisions?*
- MGL associated with “accidental” conduct (hit by teammate, fall, hit by puck) increased 8-fold (from 17 to 136) year to year
 - *Should we be making changes to the environment and equipment to address these?*



Discussion Points

Fighting

- Fighting accounts for 8% of the concussions and 16% of the MGL this year
- The number of concussions and man games lost due to fighting has increased significantly – MGL increased from 0 to 120 year to year.
- Concussions reported from fighting are likely understated.

➤ *Should changes be made to the rules regarding fighting?*



Discussion Points

Legal Head Hits

- Over the past two seasons, there were 24 “legal hits” to the head resulting in concussion:
 - 14 shoulder to head
 - 5 arm to head
 - 2 helmet to helmet
 - 3 glove to head
- In the last six weeks legal hits to the head increased from 5 to 12, and account for 23% of new concussions.
 - *Should some or all of these legal hits to the head result in a penalty?*
 - *If so, given the difficulty that on-ice officials have had in identifying “principle point of contact” for Rule 48, what role would supplemental discipline have to play?*



Discussion Points

Head Hits - Environment

Glass:

- The risk of concussion is 4.4 times higher against seamless glass in the ends and the time loss is 8 times higher.
- The risk of concussion against seamless sides is about the same (but time loss is almost 2 times higher).
- The six buildings with seamless glass on the ends will be changed for 2011-12.

➤ *Should seamless glass on sides be changed as well?*



Discussion Points

Head Hits - Environment

Boards:

- 13% of concussions over the past two years (19/147) involve contact with the boards. 5/19 resulted in a penalty.
 - *Should more of these hits result in a penalty?*
- Of the 102 concussions caused by legal hits and illegal hits this year, 57 (56%) have been along the boards.
 - *Should the player doing the hitting along the boards bear more responsibility?*
 - *What responsibility should the player being hit bear for being aware of his surroundings?*



Charging, Boarding

Discussion
Video